Eat, Drink, and Be Labouring?

Jennifer A. Beggs, JP, RN, CM, M Mid
M. Colleen Stainton, RN, DNSc

JENNIFER BEGGS is a certified midwife in the Antenatal Ward at the Royal Hospital for Women in Sydney, Australia. M. COLLEEN STAINTON is Professor and Clinical Chair of Women's Health Nursing in the Department of Family and Community Health Nursing at the University of Sydney and at the Royal Hospital for Women in Sydney, Australia.

Abstract

The practice of restricting oral intake during labour has been and remains controversial. Overall, the nutritional needs of labouring women are poorly understood. This literature review reveals that little evidence exists to support the general restriction of oral intake for all labouring women. Education of health professionals and pregnant women regarding intake in labour is required to encourage collaboration in the development and institution of appropriate policies in keeping with the available evidence for best practice.

***Journal of Perinatal Education*, *11*(1), 1–13;** *oral intake, labour, aspiration, policies, gastric motility.*

Introduction

Throughout their pregnancy women are advised and encouraged to maintain a nourishing diet. Labour is a strenuous process requiring energy and stamina. However, during labour, the practice of restricting oral intake to varying degrees is common. The question of appropriate oral intake during labour has been controversial for many years and has been revisited frequently with no definitive answers. This practice provokes personal thought and deep discussion of scientific facts, anecdotal evidence, and emotive arguments.

Labour is a strenuous process requiring energy and stamina. However, during labour, the practice of restricting oral intake to varying degrees is common.

Research has not reported any detrimental effects on maternal or neonatal outcomes from allowing food and fluids during labour (CNM Data Group, 1999; Newton & Champion, 1997; O'Reilly, Perrone-Hoyer, & Walsh, 1993). However, hesitancy in instituting changes in regard to this practice persists. Midwifery focuses on the normalcy of childbirth; therefore, if childbirth is a normal physiological process, midwives should not interfere by restricting basic nourishment to a woman in labour. Indeed, it has been suggested that fasting or restricting oral intake in labouring women may cause them to harbor a preoperative attitude to childbirth (Hazle, 1986).

The practice of restricting oral intake during labour was originally introduced in the 1940s to prevent gastric aspiration pneumonitis in the event of operative intervention requiring general anaesthetic (Mendelson, 1946). With advances in midwifery and obstetric practice and refinements of analgesia and anaesthesia, the validity of this practice can be questioned.

A search for available literature was conducted through Medline, Cumulative Index of Nursing and Allied Health (CINAHL), and on-line resources and was limited to texts in English. This literature review explores the available research evidence regarding oral intake during labour and the historical reasons this restrictive practice was instituted. Current policies are discussed, and issues affecting the hesitancy of units to implement change in policies are explored.

Maternal Opinion of Restricted Intake in Labour

In a pilot survey of new mothers, Simpkin (1986) investigated stress associated with childbirth events. Among the survey respondents, 57% ($N = 159$) found the restriction of fluids moderate to most stressful and 27% found food restriction moderate to most stressful. Similarly, a survey of labour concerns among women two months after delivery (Fowles, 1998) asked participants, "Is there anything about your labour and delivery that is still bothering you?" Included was a response from a woman who, two months later, remained distressed and confused over why she was not allowed any fluids in labour.

Women tend not to be aware of or complain about oral intake policies during actual labour. The majority appears to accept unit policies and procedures. At the time of labour, the issue of oral intake appears to concern the midwife more than the labouring woman, whose focus tends towards the pain of labour (Fowles, 1998). Postnatal surveys highlight the discomfort of restrictive intake for women, after the fact. Antenatal education needs to include more information and discussion regarding oral intake in labour. With information and understanding of unit policies and the benefits and risks of oral intake in labour, labouring women will be able to participate in decisions regarding intake, rather than merely to reflect on its role after the birth has occurred.

With information and understanding of unit policies and the benefits and risks of oral intake in labour, labouring women will be able to participate in decisions regarding intake, rather than merely to reflect on its role after the birth has occurred.

Issues Affecting Oral Intake in Labour

During the 1940s, when a large proportion of vaginal births were assisted using general anaesthesia, a significant number of women were observed to have pulmonary complications following delivery. These complications were identified as being caused by the aspiration of stomach contents into the lungs during general anaesthesia (Mendelson, 1946). Subsequent research on the gastrointestinal physiology identified inherent changes associated with the process of labour and delivery. These inherent differences heralded the restriction of oral intake during labour.

Delayed Gastric Emptying

Delayed gastric emptying in labour remains the major reason for prohibiting or restricting oral intake in labour. During pregnancy, the gastrointestinal tract undergoes positional and physiological changes. Due to the encroaching uterus, the stomach axis rotates to the right and assumes a horizontal position. This positional change may hinder gastric emptying by causing pocketing of gastric contents (Conklin, 1991). The hormone progesterone is elevated in pregnancy and has a relaxing

effect on smooth muscle, slowing peristalsis and therefore also slowing gastric emptying (Thomson, 1996).

In the 1940s, an American researcher, Curtis Mendelson, identified delayed gastric emptying in labour as the cause of pulmonary aspiration pneumonitis (i.e., regurgitation and aspiration of food particles and/or fluids into the lungs causing destruction and/or inflammatory changes similar to acute asthma). This condition subsequently became known as *Mendelson Syndrome*. Mendelson (1946) deemed this phenomena preventable and advocated a nil-by-mouth policy for labouring women.

Subsequent research supported the finding of a delay in gastric emptying in labour. This was determined by measuring the volume of stomach contents during labour and following delivery. Early research data showed minimal, if any, delay in labour (Frame, Allison, Moir, & Nimmo, 1984; Hutchinson, 1967; Nimmo, Wilson, & Prescott, 1975). Later, research by O'Sullivan, Sutton, Thompson, Carrie, and Bullingham (1987) and by Carp, Jayaram, and Stoll (1992) found gastric emptying delayed for many hours after the onset of labour. The variation in the type of methodology used in the studies may explain the differences in results. A study in 1967 by Hutchinson involved the invasive and unpleasant technique of using gastric tubes to measure gastric aspiration. Some tubes were placed prior to general anaesthetic and must have been extremely distressing for the women. Exact positioning of the gastric tubes was unknown and may account for the vast array of aspirates obtained (0ml-400ml). Carp et al. (1992) and O'Sullivan et al. (1987) used high-resolution ultrasonography to examine gastric contents in parturients. Both researchers related difficulties in locating the stomach in some participants. Carp and colleagues (1992) performed ultrasound examination following the placement of epidural analgesia. This may have affected results, because epidural analgesia is reported to influence gastric emptying. The gravid uterus may also impede complete evaluation of the stomach contents. Overall, these researchers agree that some delay in gastric emptying occurs during labour and, thus, oral intake should have some restrictions. However, the degree of delay remains relatively unknown.

Gastric Acidity and pH

If aspirated, both the volume and acidity of gastric content are potentially hazardous. During early experiments with rabbits, Mendelson (1946) noted that the gastric hydrochloric acid in gastric aspirate produces an irritated reaction in the lungs. The more acidic the aspirate, the greater the severity of the inflammatory response, which increases the risk of maternal mortality/morbidity (Rowe, 1997). The asthma-like reaction occurs when the gastric acid pH is below 2.5 (causing Mendelson Syndrome) and the volume of aspirate in the lungs is greater than 25ml. Women who experience these levels are considered at "high risk" of maternal mortality/morbidity (Roberts & Shirley, 1974). Thus, ideas of neutralising gastric contents were initiated by Mendelson (1946) and have continued as new antacids appear.

Randomised controlled trials using antacids and H2 receptor antagonists found varied results. Study samples included term obstetric women who were placed in the following categories: labouring, requiring emergency cesarean delivery, and nonlabouring with elective cesarean delivery (Frank, Evans, Flynn, & Aun, 1984; Yau, Kan, Gin, & Oh, 1992). By inserting gastric tubes, gastric contents were aspirated following induction of general anaesthesia. Medications included Magnesium Trisilicate BPC, Sodium Citrate, Cimetidine, Omeprazole, and Ranitidine. Single and dual regimens were trialed. Sodium Citrate rendered gastric content alkaline, but was associated with a wide range of residual volumes (Frank et al., 1984; Yau et al., 1992). According to research by Roberts and Shirley (1974), high residual volumes place women at greater risk of aspiration. Magnesium Trisilicate BPC resulted in alkaline aspirates; however, researchers noted the possibility of inadequate mixing of gastric juices with the antacid and the pulmonary damage caused by aspirating particulate antacids. Cimetidine decreased gastric volumes and increased gastric acid pH, though not in all women (Yau et al., 1992).

Although informed consent of women was obtained for these studies, the need for dual medication regimens and repeated dosage may cause discomfort and disruption during labour and, thus, affect the psyche of labouring women. Neither of the studies described above mentioned the acceptability of regimens by the women, poststudy. However, results of these studies highlight interpatient variability and the problem that no prophylactic antacid is wholly or singularly effective in decreasing gastric volumes and increasing gastric pH in all women. Regardless of these findings, antacid therapy regimens remain a popular prophylactic treatment

against aspiration for labouring women requiring operative intervention.

Factors Affecting Gastric Emptying

Although gastric emptying is cited as the major reason for prohibiting or restricting oral intake during labour, other factors are thought to affect gastric emptying. These factors include stress, anxiety, vomiting, and analgesia.

Stress and Anxiety

Stress, pain, and anxiety have also been thought to affect gastric emptying in labour, possibly due to stimulation of the sympathetic nervous system; however, endogenous opioids may account for this delay (Porter, Bonello, & Reynolds, 1997). Other researchers concur that pain, stress, and emotional disturbances of labour account for delayed gastric emptying in labour and the rapid return to normal function following delivery (Davison, J., Davison M., & Hay, 1970). One study that examined the effect of anxiety on the rate of gastric emptying of liquids failed to demonstrate an association between gastric emptying and anxiety (Lydon, McGinley, Cooke, Duggan, & Shorten, 1998). Using a paracetamol (acetominophen) absorption technique, researchers examined 20 patients (10 male, 10 female) who underwent various surgical procedures unrelated to labour and were given 1.5gm of paracetamol, plus 50ml of water. Peak levels of paracetamol were obtained by venous samples. Studies were performed before surgery and repeated 4–10 weeks later. Gastric emptying was found to be similar pre- and postsurgery. This sample was small and included both males and nonpregnant females; therefore, it cannot be generalised to the labouring population. However, if stress and anxiety delay gastric emptying, this effect would be evident in any stressful event.

Incidence of Vomiting

Delayed gastric emptying in labour and subsequent stasis of stomach content increases the risk of vomiting. Vomiting is thought to be a common event in labour (McGarry, 1971); however, not all labouring women vomit. Vomiting in labour is not a main theme in the majority of research that was reviewed. The three studies described below did address vomiting.

One study compared anti-emetics used in labour (McGarry, 1971). The study sample consisted of 584 women in normal labour. When analgesia was requested, an anti-emetic (Metoclopramide, Phenazine, or a placebo of normal saline) was administered concurrently. Thirty-nine women vomited following medication; 27 of these women had received the placebo. The analgesic given was Pethidine Hydrochloride (meperidine), a side effect of which is nausea or possible vomiting. Anti-emetics were given not as a measure to halt vomiting, but as a preventative treatment in conjunction with analgesia. The possibility that vomiting was related to the analgesia and not to labour was not acknowledged in this study.

In a study of unrestricted oral intake and the incidence of vomiting in labour ($N = 106$), over 80% of women did not vomit (O'Reilly et al., 1993). Women chose to eat during early and active labour. The frequency of intake declined as labour progressed. Each of the 20 women who did vomit experienced normal outcomes. O'Reilly and colleagues (1993) believed these outcomes suggested a relatively low incidence of vomiting and a low risk of complications related to oral intake in labour.

These conclusions were not duplicated by Scrutton, Metcalfe, Lowy, Seed, and O'Sullivan (1999) who conducted a randomised-controlled trial to assess the risks and benefits of eating during labour. Forty-three women were allowed a low residue, light diet and 43 women were only allowed water. Following delivery, real-time ultrasonography was used to compare residual gastric volumes. This revealed significantly higher residues in the eating group. Although no detrimental outcomes were reported, Scrutton et al. (1999) predicted an increased risk of vomiting and aspiration in the event a general anaesthesia was needed. This risk would be due to increased residual volume of gastric contents; therefore, the researchers did not support a policy for food in labour. With the exception of mentioning that the diet was well accepted, these researchers reported no psychological responses during or following the trial.

Systemic Analgesia

Labour is a painful but normal, physiologic process. A woman's perception of and response to pain is subject to emotional, social, motivational, cultural, and physiological variables (Lowe, 1996). The function of pain in

labour is not well understood and rarely researched. Many women request pharmacologic intervention during labour. The most widely used systemic analgesia is Pethidine Hydrochloride (meperidine), an opiate. Opioids provide analgesia without loss of consciousness by "altering perception of and emotional response to pain" (Nursing '95 Drug Handbook, p. 347). Side effects of opioids include drowsiness, nausea, vomiting, and delayed gastric emptying (Lowe, 1996).

A meta-analysis of studies compared the effects of parenteral opioids versus epidural analgesia on the progress of labour. Parenteral opioids were reported to have little effect on labour pain and poor pain relief in both the first and second stages of labour, but with less vigorous neonates (Halpern, Leighton, Ohlsson, Barrett, & Rice, 1998). This concern was also raised in a recent systematic review of intramuscular opioids for maternal pain relief in labour (Elbourne & Wiseman, 2000). Opioids do afford some, though not complete, pain relief in labour. The effects are dose related and limited by their side effects (Chalmers, Enkin, & Keirse, 1990). Regardless of methodology, researchers have consistently found a significant delay in gastric emptying in labour following the use of systemic opioids (Frame et al.,1984; Frank et al., 1984; Holdsworth, 1978; McGarry, 1971; Murphy, Nally, Gardiner, & Unwin, 1984; Nimmo et al., 1975; O'Sullivan et al., 1987; Zimmerman, Breen, & Fick, 1996). This delay enhances the risk of pulmonary aspiration and is caused by the opiate effect of decreasing smooth-muscle tone in the gastrointestinal tract (O'Sullivan et al., 1987). With such a marked effect on gastric emptying and the limited analgesic effect, the value of administering Pethidine during labour would appear to be questionable, a notion also supported by Elbourne and Wiseman (2000). Research evidence supporting alternative systemic analgesics for use during labour could not be found in the literature reviewed.

Epidural Analgesia

Epidural analgesia is a popular and effective form of analgesia, offering complete pain relief. Epidural analgesia is widely used in industrialised countries and growing in popularity for analgesia/anaesthesia in vaginal, instrumental, and cesarean deliveries.

Although producing effective analgesia/anaesthesia while preserving maternal consciousness, epidural analgesia is not without side effects. Epidural analgesia using local anaesthetic alone (e.g., Bupivacaine, Ropivacaine) has rapid onset and is thought to have little or no effect on gastric emptying during labour (Fox & Rowbotham, 1999; Frame et al., 1984; Porter et al., 1997; Zimmerman et al., 1996). Epidurally administered local anaesthetic, however, causes motor blockade or paralysis of the lower limbs (Carrie, O'Sullivan, & Seegobin, 1981), which restricts maternal movement. Experimentation and modification of epidural analgesic agents have found that a smaller dose of local anaesthetic combined with an opioid (e.g., Fentanyl) affords a more effective analgesia of longer duration (Justins, Knott, Luthman, & Reynolds, 1983). However, this introduces the opioid effect of delaying gastric emptying. The delay, as in systemic opioids, is dose-dependent (Wright, Allen, Moore, & Donnelly, 1992). Fentanyl doses totalling less than 100mcgs have been shown not to cause any delay in gastric emptying (Porter et al., 1997; Zimmerman et al., 1996).

Research on epidural use and its effect on gastric emptying continues and results remain controversial. Any advances in modifying medications in epidurals to elicit little or no change in gastric emptying may lead to a change in policies for oral intake in labour when an epidural is used.

Research on epidural use and its effect on gastric emptying continues and results remain controversial.

With advances in obstetric analgesia/anaesthesia, an increasing number of instrumental deliveries and operative interventions are now undertaken using regional anaesthesia (Hawkins, Gibbs, Orleans, & Martin-Salvaj, 1997). Women remain awake and in control of their airway. Otherwise, when using general anaesthesia, anaesthetists are responsible for obtaining and maintaining airway control. Proponents who advocate oral intake in labour argue that the decrease in general anaesthesia is more reason to allow oral intake. However, anaesthetists remain guarded. They argue that the possibility always exists that a general anaesthetic may be required (Rasmussen & Malinow, 1994).

General Anaesthesia and Maternal Mortality

The number of deaths attributed to complications during general anaesthetic (GA), including aspiration of stomach contents, initially declined over the last 40 years; however, now the number remains stable (see Figure 1). The statistics collected on GA deaths at birth do not address the oral intake of the women during labour.

With the increased use of regional anaesthesia, researchers report these findings as discouraging (DOH, 1991–1993; Hawkins, Koonin, Palmer, & Gibbs, 1997; James, 1992; Morgan, 1987), although perhaps this can be explained by an increase in cesarean births. The majority of deaths attributed to anaesthesia have occurred during induction of GA for cesarean birth, with unsuccessful intubation and inhalation of gastric contents being the noted causes of operative maternal death (Hawkins, et al., 1997; James, 1992; Morgan, 1987).

Physiological changes in pregnancy contribute to difficulties in intubating obstetric patients. Increased girth-exerting pressure on the stomach and oedema of soft tissue, including the larynx and oropharynx, add to the difficulty in visualising vocal cord structures necessary for successful tracheal intubation (Conklin, 1991; Rasmussen et al., 1994). Deaths related to complications during anaesthesia still occur despite advances in administration and technique (Hawkins, et al, 1997). Anaesthetist experience is an integral part of airway management in the obstetric patient.

Physiological changes in pregnancy and time constraints in an emergency situation can lead to errors in clinical observation, judgement, and subsequent mismanagement of anaesthesia. Inexperience of the anaesthetist has been associated with maternal morbidity and mortality (Harrison, 1978; Hawkins, et al., 1997; James, 1992; Rasmussen et al., 1994). Experience and skill in obtaining and maintaining a parturient airway under general anaesthesia may decline and be lost as the use of regional anaesthesia increases (Hawkins, et al., 1997). This may potentially increase the risk of maternal complications and foster continued hesitancy by anaesthetists to allow unrestricted intake in labour.

Figure 1 Deaths Attributed to General Anaesthesia during Cesarean Section

Country	1979–1981	1982–1984	1985–1987	1988–1990	1991–1993
Australia				2	3
United Kingdom			6	4	8
England, Wales	22	18	5	3	
United States of America	← 33 →		← 32 →		
Netherlands		1983 ← 2 → 1992			

Note:
This figure does not address rates/population, which limit the information to trends across time with a country.

Sources:

Department of Health, Welsh Office, Scottish Office Home and Health Department, Department of Health and Social Services, Northern Ireland. [DOH]. *Report on confidential enquiries into maternal deaths in the United Kingdom 1988–1990*. Her Majesty's Stationary Office (HMSO), London.

Department of Health, Welsh Office, Scottish Office Department of Health, Department of Health and Social Services, Northern Ireland. [DOH]. *Report on confidential enquiries into maternal deaths in the United Kingdom 1991–1993*. Her Majesty's Stationary Office (HMSO), London.

Hawkins, J. L., Koonin, M. N., Palmer, S. K., & Gibbs, C. P. (1997). Anaesthesia related deaths during obstetric delivery in the United States 1979–1990. *Anaesthesiology, 86*(2), 281.

Health Care Committee, National Health and Medical Research Council. *Report on maternal deaths in Australia 1988–1990*. National Health and Medical Research Council (NHMRC), Canberra.

Morgan, M. (1987). Anaesthetic contribution to maternal mortality. *British Journal of Anaesthesia, 59*(7), 844.

National Health and Medical Research Council. (1998). *Report on maternal deaths in Australia 1991–1993*. National Health and Medical Research Council (NHMRC), Canberra.

Scheepers, H. C. J., Essed, G. G. M., & Brouns, F. (1998). Aspects of food and fluid intake during labour: Policies of midwives and obstetricians in The Netherlands. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 78*(1), 37–40.

Ketonuria and Hydration in Labour

The presence of ketonuria during labour was thought to be a pathological indication of dehydration and starvation requiring intervention (Foulkes & Dumoulin, 1985). Routine use of intravenous hydration became a common intervention due to the restriction of oral intake

(Tourangeau, Carter, Tansil, McLean, & Downer, 1999). Intravenous therapy itself introduces the possibility of further problems, including restricted maternal mobility, pain, discomfort, access for infection, and potential fluid overload. Although intravenously administered fluids provide hydration, they contain minimal calories and are an inadequate source of energy during labour (Newton N., Newton M., & Broach, 1998).

In an attempt to change their policy of routine intravenous hydration for all labouring women, Tourangeau and colleagues (1999) conducted a trial in Toronto, Canada, where women received intravenous therapy only if individually required. Women were encouraged to drink and eat small snacks throughout labour. In the convenience sample of 219 women, 162 (74%) received intravenous therapy at some stage during labour for antibiotics, oxytocinon administration, or pre-epidural fluid bolus. Ketonuria was assessed during labour and following delivery. Ketonuria was found to be more frequent in the group of women who did not receive intravenous therapy (50% vs. 36.4%). Following delivery, no extreme ketone values were reported. The study concluded that a serious increase in ketosis did not eventuate when intravenous therapy was withheld. This finding challenges the routine practice of restricting oral intake in labour and the practice of administering intravenous fluids. Clinicians involved in the study agreed that encouraging adequate oral intake and withholding intravenous hydration—unless required—enhanced maternal and neonatal psychological and physiological outcomes (although these outcomes were not mentioned). These findings support Anderson (1998) who considers ketonuria a physiological indication of the body's use of fatty acids as an alternative energy source when oral intake is restricted. Physiologic ketonuria involves no change in maternal blood pH and primarily occurs during excessive exercise and starvation. Due to these findings, labouring women have been compared to competing athletes (Hazle, 1986). Hazle (1986) contends that similarities between labouring women and athletes include a reduction in gastric emptying times (this occurs in the athlete secondary to strenuous exercise). Both utilise glucose stores and oral fluids to sustain blood glucose levels when food is restricted. Hazle (1986) classifies labour as a moderate-to-severe exercise from a cardiovascular perspective, with an increase in cardiac output similar to the competing athlete. However, through his observation of labouring women, Odent (1998) disputes this comparison, theorising that women have a tendency to be immobile in the first stage of labour. Skeletal muscles are at rest and energy expended is minimal. The smooth, involuntary uterine muscle is energy efficient and uses fatty acids deposited during pregnancy as a fuel when intake is restricted. The end products of the metabolism of fatty acids are ketones. Odent (1998) concurs that the excess ketones are excreted in the urine and are a physiological indication of the body's utilisation of fat stores for energy, rather than an indication of dehydration.

Labour and birth are normal physiological processes with their own unique, inherent mechanisms to facilitate birth. To compare labouring women with either passive surgical patients or athletes (Hazle, 1986) detracts from this unique and normal process. To further understand the nutritional needs of labouring women, the process of labour and birth needs to be recognised, accepted, and researched as an entity of its own, not as a "condition" where nutritional needs are identified according to comparisons of energy expenditure.

Oral Intake in Labour

Do Labouring Women Need to Eat and Drink in Labour?

With human evolution in mind, Newton, N. et al. (1988) theorised that food and fluids may not always have been available during labour. The gathering of food and fluids may have ceased as painful uterine activity progressed. Newton, N. et al. (1988) suggest extravascular water retention and easily accessible fat deposits stored up during pregnancy may well have prepared the parturient body for this time. This author's general enquires regarding recent oral intake of women presenting to the delivery suite of a major teaching hospital found that women often reported a gradual decline in food intake, though a normal fluid intake had occurred during the previous two days. Is this an inherent response of the body preparing to expend energy on labour? Odent (1998) thinks not; he contends that labour rarely commences when a pregnant woman is hungry. Odent (1998) argues that hunger itself causes an increase in catecholamines, which in turn can postpone labour. Odent (1998) suggests that if a woman in early labour eats, it means food is required to establish active labour.

Do Women Want to Eat in Labour?

If given a choice, the majority of women choose to eat and drink in labour. A review of trends in midwifery practice regarding oral intake in labour (CNM Data Group, 1999) found that, in healthy gravidas at term (N = 3338), many chose to eat and drink in labour. O'Reilly et al. (1993) elicited similar results in their study of oral intake and emesis in low-risk mothers, finding 100% of the 106 women chose to eat and drink throughout all stages of labour.

While formulating and auditing a policy for oral intake in labouring women in Nottingham, England, Newton and Champion (1997) found that 75% (N = 250) of the women ate while in early labour. The National Birth Centre Study (Rooks, Weatherby, & Ernst, 1992)—a prospective, descriptive study of intrapartum and immediate postpartum and neonatal care provided in birth centres across America (N = 11,814 women)—reports that 41.4% of women consumed nonclear fluids or solid food while in labour. Although most women chose to eat in labour, studies concede that a definite lack of information and research exists on nutritional requirements and appropriate foods in labour (Berry, 1997; Garcia & Garforth, 1989; Newton & Champion, 1997). Reviewed studies reflect this lack: diets offered included low residue, low fat, high carbohydrate, neutral pH, neutral temperature, homogenous, high protein, light diet, normal diet, convenient, and tasty (Berry, 1997: Michael, Reilly, & Caunt, 1991; Newton & Champion, 1997; Scrutton et al., 1999). Regardless of foods available, diets were well accepted by the women.

A common and important observation throughout the studies was a progressive decline or self-restriction of solid food as labour progressed (Scrutton et al.,1999; CNM Data Group, 1999; O'Reilly et al., 1993). This appears logical. As the frequency and intensity of contractions increase, labouring women would feel less inclined to eat. If there is an inherent instinct to self-restrict intake as labour progresses, is there a need to impose further restrictions?

Although the majority of women choose to eat and drink during labour, some women choose not to do so. The choice needs to be respected because labouring women are following natural instincts. According to Odent (1998) and Anderson (1998), encouraging women to eat against their instincts is an intervention. These researchers advise labouring women to listen to their bodies, intuition, and natural instincts. They also encourage health professionals to heed the information that these women report.

Policies for Oral Intake in Labour

Policies governing oral intake in labour are diverse. Many remain restrictive, allowing only clear fluids when labour becomes established. Figure 2 presents an analysis of five surveys of maternity units and their polices relating to oral intake in labour. These postal surveys were compiled for England, Wales, United States of America, and The Netherlands in reports published between 1988 and 1998. Figure 3 provides details of the surveys summarized in Figure 2. Approximately 80% reported vary-

Figure 2 Analysis of Oral Intake Policies

Author	Year	Country	No. of Maternity Units	Unrestricted food and fluid intake	Food restriction in active labour	Food not allowed	Water anytime/ ice chips	Fluids only	NBM, no intake in labour	Written policy for intake in labour	No policy for oral intake
Michael et al.	1991	England and Wales	278	88 (25%)	190		67		10	221	57
Garcia & Garforth	1989	England	220	15 (8%)	110 (50%)	86	189	147	3	4	
Berry	1997	England (all regions)	70	38	32	70					
McKay & Mahan	1988	America	217	12 (5%)			41	115	61	213	4
Scheepers et al.	1998	Netherlands	midwives = 40 obstetricans = 22	26 (42%)	16						19

Figure 3 Summary of Policies Relating to Oral Intake in Labour

Total Number of Maternity Units	785
Units with Unrestricted Oral Intake	153 (19%)
Units with Food Restriction in Labour	122 (16%)
Units Allowing Fluids Only in Labour	486 (62%)
Units with Varying Degrees of Restriction	632 (79%)

Sources:

Michael, S., Reilly, C. S., & Caunt, J.A., (1991). Policies for oral intake during labour: A survey of maternity units in England and Wales. *Anaesthesia, 46*(12), 1071–1073.

Garcia, J., & Garforth, S. (1989). Labour and delivery routines in English consultant maternity units. *Midwifery, 5*(4), 155–162.

Berry, H. (1997). Feast or famine? Oral intake during labour: Current evidence and practice. *British Journal of Midwifery, 5*(7), 413–417.

McKay, S., & Mahan, C. (1988). How can aspiration of vomitus in obstetrics best be prevented? *Birth, 15*(4), 222–229.

Scheepers, H. C. J., Essed, G. G. M., & Brouns, F. (1998). Aspects of food and fluid intake during labour. Policies of midwives and obstetricians in The Netherlands. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 78*(1), 37–40.

ing degrees of restriction on food and/or fluids during labor (see Figure 3). Also, out of 785 units, only 153 allow unrestricted intake throughout labour. A total of 632 units uphold restrictive policies to varying degrees, and 61 units do not have a policy for oral intake in labour. Throughout the countries, units without policies or policies restricted to clear fluids highlight the hesitancy in allowing food during labour.

No data could be found for Australian units. A limitation of the analysis in Figure 2 is that three of the surveys were conducted in England and all may have involved some of the same maternity units (Berry, 1997; Garcia & Garforth, 1989; Michael et al., 1991). A survey conducted by Michael and colleagues (1991) included maternity units in Wales. It is difficult to approximate the increase in units allowing oral intake over the 10-year period; however, the results reveal approximately one-third of the units in each study allowed any food in labour. The reviewed surveys were replications of postal questionnaires and derived similar findings, substantiating the results (Mitchell, 1994).

Much of the research on policies for oral intake during labour was conducted during the 1980s. Except for Berry's (1997) survey, which was conducted in England in 1993, and a survey conducted in The Netherlands in 1998 by Scheepers and colleagues (1998), no further research was found in the 1990s literature regarding policies for oral intake. This highlights a gap in research regarding oral intake in labour. In the 1980s, oral intake in labour was questioned, researched, and reviewed extensively. During that time, the overwhelming finding was that a restriction of oral intake in labour could not be justified.

Comparing policies in England in the mid- to late-1980s to Berry (1997) it seems apparent that little has changed. Policies remain restrictive and the majority stipulate only fluids once labour has been established. Although Berry's (1997) sample of hospitals was small, (n = 70 maternity units) and therefore cannot be generalised, these policies do not reflect evidence-based practice, which again emphasises the hesitancy of maternity units to instigate policy change.

In contrast, a 1998 postal survey on the policies of midwives (N = 40) and obstetricians (N = 22) in The Netherlands found that 26 midwives and 16 obstetricians based their policies on the preferences of women in labour. Conversely, 14 midwives and 6 obstetricians upheld a restrictive policy (Scheepers et al., 1998). Although The Netherlands has a higher degree of nonrestrictive policies, this country reported a maternal mortality rate of only two deaths attributed to GA in 1983 to 1992 (see Figure 1).

Why the Hesitancy?

While researchers have not reported that it is safe to eat and drink throughout labour, none have reported detrimental effects on maternal or neonatal outcomes. Not being able simply to state that "It is safe" to allow unrestricted intake in labour may account for the majority of maternity units' hesitancy in instigating policy and practice change. In order to accomplish these changes, accurate definitions of assessment parameters, collaboration of health professionals, and consistent and uniform policies may enable and encourage larger randomised controlled trials to examine oral intake during labour. The current state is described below.

Some units place women into a high- or low-risk cate-

gory of requiring operative intervention (possibly requiring a general anaesthetic). These categories may partly explain restrictions in policies. Studies by Scrutton et al. (1999), O'Reilly et al. (1993), and CNM Data Group (1999) involve sample groups categorised as low-risk women (i.e., healthy, term gestations >37 weeks, cephalic, and singleton pregnancies with no medical or gestational conditions). High-risk women include preterm labours (<37 weeks gestation), multiple pregnancies, breech presentation, diabetes, history of antepartum haemorrhage, pregnancy-induced hypertension, preeclampsia, and known medical conditions (e.g., asthma and drug use), which may increase their risk of operative intervention or obstetric complications. Women categorised as high-risk have more restrictions placed on their oral intake.

Categories of risk and subsequent restriction within the units were found to be without uniformity and, thus, confusing. In one unit, Michael et al. (1991) found grande multiparae categorised as low-risk/no-oral-intake women and, in another unit, catagorised as high-risk/oral-intake-allowed women. Although categorised in most units as low-risk, Berry's (1997) study found only 47.1% of units allowed multiparas' food or drink in labour.

Categorising women as high-risk or low-risk of intervention assists in the structuring of oral-intake policies. Caution must be applied in categorising, especially as labour encompasses a range of normal parameters. Women are individuals and they labour accordingly, and their labours still may be considered normal. Restricting oral intake unnecessarily may precipitate further problems, including bladder function—a problem that, without treatment, can continue long after the puerperium. Environmental factors such as humidity and air conditioning can also affect fluid requirements and must be considered if restrictions become necessary. Variables affecting fluid requirements are not mentioned in the literature reviewed

Regular monitoring and observation of women who are considered high-risk allows for reassessment and restriction of oral intake as the need arises (i.e., labour deviates from the normal). Uniformity and consistency in categorising women as high-risk is imperative for both the optimal and appropriate care of labouring women and the continuity and confidence of care for health professionals.

The overall number of units without policies, or policies restricted to clear fluids (62%), are marked. Only in the United States were written policies commonly reported (98%). This was the country least likely to allow unrestricted food and fluid intake (5%). In another setting, one must look to the professionals who initiate policies within these institutions for answers. Ideally, policy formulation in the labour ward should involve a combination of health professionals, obstetricians, anaesthetists, midwifery managers, and the existing evidence base. Berry (1997) however, reported one third of restrictive policies in units throughout England were devised without midwifery manager involvement. Garcia and Garforth (1989) also noted that midwives have less influence than anaesthetists and obstetricians where policy decisions are concerned.

Why are Midwives not Involved in Policy Decisions?

Al-Najjar, an English student midwife interested in the issue of oral intake in labour, informally contacted 11 labour wards within her local region, inquiring as to the contents of their unit policy (1998). The responses were disturbing:

- In three of the units, midwives were unsure as to the specific contents of unit policies.
- One of the unit's common practice depended on whether the labour was considered normal or high-risk.
- In one unit, the documented policy was providing only fluids to all labouring women; however, a light diet given at the discretion of the attending midwife was common practice.
- In one unit, labouring women were allowed unrestricted oral intake, unless they were considered high-risk. Midwives were unable to define *high-risk*.

Policies are instituted for continuity of care and as guidelines for the safety of labouring women and health professionals, alike. Having no structured framework or policy in which change can be initiated presents confusion in practice and hesitancy to change.

If care providers are unsure whether or not policies exist or unsure of policy contents, how do they elicit policy change? If unaware of local unit policy, are they

also unaware of research evidence imperative to elicit policy changes? This review highlights the problem of research not always reaching the audience for which it is intended. Midwives who follow "common practice" rather than unit policy may be liable for disciplinary action, which further emphasises the need for a policy they support and can easily understand and follow.

Conclusion

The literature reviewed reveals an inherent delay in gastric emptying during established labour. This is exacerbated by the administration of narcotic analgesia/anaesthesia. Labouring women are categorised as being low- or high-risk for intervention. Regular observation and monitoring allows for reassessment and restriction of oral intake, if required. Food and fluids provide fuel for energy and stamina and help labour remain physiologic. If intake is restricted, the body has inherent mechanisms to facilitate the process of labour and delivery and to promote self-restriction as labour progresses. No research found for this review states that it is safe to eat and drink in labour; however, no detrimental effects on maternal or neonatal outcomes have been reported. The statistics on GA-associated deaths do not address the mother's eating and drinking history in labour.

No research found for this review states that it is safe to eat and drink in labour; however, no detrimental effects on maternal or neonatal outcomes have been reported.

Oral intake during labour remains controversial. A review of available literature reveals the majority of units allow fluids in labour; however, food remains restricted. Limited research reports on what constitutes appropriate intake. The physiological and psychological needs of labouring women are poorly understood. Recognising and accepting labour and birth as a normal physiological process is not always inherent in the research. The process is unique and cannot be compared or associated with any other "condition" or "situation." Nutritional needs should not be determined according to energy expended. Women are encouraged to listen to and follow their instincts during labour. Their choice of intake during this time should be observed and respected.

Collaboration and cooperation of anaesthetists, obstetricians, and midwives are required if progress is to be made not only in research but also in the development of unit policy. Policies are needed that allow and support flexibility to follow both a woman's individual body preferences and any particular health issues surrounding her labour. Development of unit policy and education of care providers regarding oral intake are essential to elicit a change in practice. Midwives are an excellent resource for observing, instigating, monitoring, and evaluating policy change; however, awareness of current policy and research is imperative to elicit change.

Education of pregnant women throughout antenatal clinics and classes about the importance of maintaining adequate intake during labour and the existence of policies and research governing this intake will create a heightened awareness of their physiological and psychological needs in labour. This awareness will empower women to make informed decisions regarding intake and may contribute to practice change.

This review concludes that, combined with regular observation and assessment of maternal and foetal wellbeing, unrestricted food and fluids should be a choice for women whose labour is progressing normally. This is based on a lack of evidence to support the routine restriction of food and fluids during labour. There is a need to research the physiology of gastric motility, hunger, and thirst in labour and to compare the maternal and foetal outcomes of restricted and unrestricted oral intake in labour.

There is a need to research the physiology of gastric motility, hunger, and thirst in labour and to compare the maternal and foetal outcomes of restricted and unrestricted oral intake in labour.

Acknowledgments

This paper was written as part of a master's degree program in midwifery at the University of Sydney. The help-

ful advice of Avon Strahle and Margaret Martin—both colleague midwives—in reviewing drafts of this paper is appreciated.

References

Al-Najjar, J. (1998). Policy? What policy? Hospital guidelines on food and drink in labour. *The Practising Midwife, 1*(4), 10–11.

Anderson, T. (1998). Is ketosis in labour pathological? *The Practising Midwife, 1*(9), 22–26.

Berry, H. (1997). Feast or famine? Oral intake during labour: Current evidence and practice. *British Journal of Midwifery, 5*(7), 413–417.

Carp, H., Jayaram, A., & Stoll, M. (1992). Ultrasound examination of the stomach contents of parturients. *Anaesthesia and Analgesia, 74*(5), 683–687.

Carrie, L. E. S., O'Sullivan, G. M., & Seegobin, R. (1981). Epidural fentanyl in labour. *Anaesthesia, 36*, 965–969.

Chalmers, I., Enkin, M., & Keirse, M. J. (1990). *Effective care in pregnancy and childbirth*. Oxford: Oxford Medical Publications, 2, 795–1516.

CNM Data Group (1999). Oral intake in labour: Trends in midwifery practice. *Journal of Nurse-Midwifery, 44*(2), 135–138.

Conklin, K. A. (1991). Maternal physiology adaptations during gestation, labour and the puerperium. *Seminars in Anaesthesia, X*(4), 221–234.

Davison, J. S., Davison, M. C., & Hay, D. M. (1970). Gastric emptying time in late pregnancy and labour. *Journal of Obstetrics and Gynecology of the British Commonwealth, 77*, 37–41.

Department of Health, Welsh Office, Scottish Office Department of Health, Department of Health and Social Services Northern Ireland. [DOH]. *Report on confidential enquiries into maternal deaths in the United Kingdom 1991–1993*. Her Majesty's Stationary Office (HMSO), London.

Department of Health, Welsh Office, Scottish Office, Scottish Office Home and Health Department, Department of Health and Social Security, Northern Ireland. [DOH]. *Report on confidential enquiries into maternal deaths in the United Kingdom 1988–1990*. Her Majesty's Stationary Office (HMSO), London.

Elbourne, D., & Wiseman, R. A. (2000). Types of intramuscular opioids for maternal pain relief in labour. *The Cochrane Database of Systematic Reviews, 1*(1).

Foulkes, J., & Dumoulin, J. G. (1985). The effects of ketonuria in labour. *British Journal of Clinical Practice, 39*(2), 59–62.

Fowles, E. R. (1998). Labour concerns of women two months after delivery. *Birth, 25*(4), 235–240.

Fox, A. J., & Rowbotham, D. J. (1999). Recent advances: Anaesthesia (clinical review). *British Medical Journal, 319*(7209), 557–560.

Frame, W.T., Allison, R. H., Moir, D. D., & Nimmo, W. S. (1984). Effect of naloxone on gastric emptying during labour. *British Journal of Anaesthesia, 56*(3), 263–266.

Frank, M., Evans, M., Flynn, P., & Aun, C. (1984). Comparison of the prophylactic use of magnesium triscilicate mixture BPC, sodium citrate mixture or cimetidine in obstetrics. *British Journal of Anaesthesia, 56*(4), 355–361.

Garcia, J., & Garforth, S. (1989). Labour and delivery routines in English consultant maternity units. *Midwifery, 5*(4), 155–162.

Halpern, S. H., Leighton, B. L., Ohlsson, A., Barrett, J. F. R., & Rice, A. (1998). Effect of epidural vs. parenteral opioid analgesia on the progress of labour. *The Journal of the American Medical Association, 280*(24), 2105–2110.

Harrison, G. G. (1978). Death attributable to anaesthesia: A 10–year survey (1967–1976). *British Journal of Anaesthesia, 50*, 1041–1046.

Hawkins, J. L., Gibbs, L. P., Orleans, M., & Martin-Salvaj, G. (1997). Obstetric anaesthesia work force survey: 1981 versus 1992. *Anaesthesiology, 87*(1), 135–143.

Hawkins, J. L., Koonin, L. M., Palmer, S. K., & Gibbs, C. P. (1997). Anaesthesia related deaths during obstetric delivery in the United States 1979–1990. *Anesthesiology, 86*(2) 277–284.

Hazle, N. R. (1986). Hydration in labour: Is routine intravenous hydration necessary? *Journal of Nurse Midwifery, 31*(4), 171–176.

Health Care Committee, National Health and Medical Research Council. *Report on maternal deaths in Australia 1988–1990*. National Health And Medical Research Council (NHMRC), Canberra.

Holdsworth, J. D. (1978). Relationship between stomach contents and analgesia in labour. *British Journal of Anaesthesia, 50*, 1145–1148.

Hutchinson, B. R. (1967). The vomiting hazard in obstetric anaesthesia. *Australian and New Zealand Journal of Obstetrics and Gynaecology, 7(1),* 104–107.

James, C. (1992). Maternal mortality. *Seminars in Anesthesia, X1*(1), 76–82.

Justins, D. M., Knott, C., Luthman, J., & Reynolds, F. (1983). Epidural versus intramuscular fentanyl. *Anaesthesia, 38*(10), 937–942.

Lowe, N. K. (1996). The pain and discomfort of labour and birth. *Journal of Obstetric, Gynecologic, and Neonatal Nursing, 25*(1), 82–92.

Lydon, A., McGinley, J., Cooke, T., Duggan, P. F., & Shorten, G. D. (1998). Effect of anxiety on the rate of gastric emptying of liquids. *British Journal of Anaesthesia, 81*(4), 522–525.

McGarry, J. M. (1971). A double blind comparison of the

anti-emetic effect during labour of metoclopramide and perphenazine. *British Journal of Anaesthesia, 43*, 613–615.

McKay, S., & Mahan, C. (1988). How can aspiration of vomitus in obstetrics best be prevented? *Birth, 15*(4), 222–229.

Mendelson, C. L. (1946). The aspiration of stomach contents into the lungs during obstetric anaesthesia. *American Journal of Obstetrics and Gynaecology, 52*, 191–205.

Michael, S., Reilly, C. S., & Caunt, J. A. (1991). Policies for oral intake during labour: A survey of maternity units in England and Wales. *Anaesthesia, 46*(12), 1071–1073.

Mitchell, C. A. (1994). The evolution of research: From science to practice. In G. LoBiondo-Wood & J. Haber (Eds), *Nursing research* (pp. 57–87). St Louis, MO: Mosby.

Morgan, M. (1987). Anaesthetic contribution to maternal mortality. *British Journal of Anaesthesia, 59*(7), 842–855.

Murphy, D. F., Nally, B., Gardiner, J., & Unwin, A. (1984). Effect of metoclopramide on gastric emptying before elective and emergency caesarean section. *British Journal of Anaesthesia, 56*(10), 1113–1116.

National Health and Medical Research Council. (1998). *Report on maternal deaths in Australia 1991–1993*. National Health And Medical Research Council (NHMRC), Canberra.

Newton, C., & Champion, P. (1997). Oral intake in labour: Nottinghams's policy formulated and audited. *British Journal of Midwifery, 5*(7), 418–422.

Newton, N., Newton, M., & Broach, J. (1988). Psychologic, physical, nutritional and technologic aspects of intravenous infusion during labour. *Birth, 15*(2), 67–72.

Nimmo, W.S., Wilson J., & Prescott, L. F. (1975). Narcotic analgesics and delayed gastric emptying during labour. *The Lancet, 1*, 890–893.

Nursing '95 Drug Handbook (1995). *Nursing '95 books* (p. 374). Pennsylvania: Springhouse Corporation.

Odent, M. (1998). Labouring women are not marathon runners. *The Practising Midwife, 1*(9), 16–18.

O'Sullivan, G. M., Sutton, A. J., Thompson, S. A., Carrie, L. E., & Bullingham, R. E. (1987). Noninvasive measurement of gastric emptying in obstetric patients. *Anaesthesia and Analgesia, 66*(6), 505–511.

O'Reilly, S. A., Perrone-Hoyer, P. J., & Walsh, E. (1993). Low risk mothers, oral intake and emesis in labour. *Journal of Nurse Midwifery, 38*(4), 228–235.

Porter, J. S., Bonello, E., & Reynolds, F. (1997). The influence of epidural administration of fentanyl infusion on gastric emptying in labour. *Anaesthesia, 52*(12), 1151–1156.

Rasmussen, G. E., & Malinow, A. M. (1994). Toward reducing mortality: The problem airway in obstetrics. *International Anaesthesiology Clinics, 32*(2), 83–101.

Roberts, R. B., & Shirley, M. A. (1974). Reducing the risk of acid aspiration during caesarean section. *Anesthesia and Analgesia, 53*(4), 859–868.

Rooks, J. P., Weatherby, N. L., & Ernst, E. K. M. (1992). The National Birth Centre Study part II—Intrapartum and immediate postpartum and neonatal care. *Journal of Nurse Midwifery, 37*(5), 301–330.

Rowe, T. F. (1997). Acute gastric aspiration: Prevention and treatment. *Seminars in Perinatology, 21*(4), 313–319.

Scheepers, H. C. J., Essed, G. G. M., & Brouns, F. (1998). Aspects of food and fluid intake during labour. Policies of midwives and obstetricians in The Netherlands. *European Journal of Obstetrics & Gynaecology and Reproductive Biology, 78*(1), 37–40.

Scrutton, M. J. L., Metcalfe, G. A, Lowy, C., Seed, P. T., & O'Sullivan, G. (1999). Eating in labour: A randomised controlled trial assessing the risks and benefits. *Anaesthesia, 54*(4), 329–334.

Simpkin, P. (1986). Stress pain and catecholamines in labour: Part 2. Stress associated with childbirth events: A pilot survey of new mothers. *Birth, 13*(4), 234–240.

Thomson, V. (1996). Psychological and physiological changes of pregnancy. In V. R. Bennett & L. K. Brown (Eds.), *Myles textbook for midwives*, (pp.94–105). Hong Kong: Churchill Livingstone Publications.

Tourangeau, A., Carter, N., Tansil, N., McLean, A., & Downer, V. (1999). Intravenous therapy for women in labour: Implementation of a practice change. *Birth, 26*(1), 31–36.

Wright, P. M. C., Allen, R. W., Moore, J., & Donnelly, J. P. (1992). Gastric emptying during lumbar extradural analgesia in labour: Effect of fentanyl supplementation. *British Journal of Anaesthesia, 68*(3), 248–251.

Yau, G., Kan, A. F., Gin, T., & Oh, T. E. (1992). A comparison of omeprazole and ranitidine for prophylaxis against aspiration pneumonitis in emergency caesarean section. *Anaesthesia, 47*(2), 101–104.

Zimmerman, D. L., Breen, T.R., & Fick, G. (1996). Adding fentanyl 0.0002% to epidural bupivacaine 0.125% does not delay gastric emptying in laboring parturients. *Anaesthesia & Analgesia, 82*(3), 612–616.